REMARKS

In response to the restriction between Group I (claims 1-15, 39-40 and 43 and Group II claims 16-38, 41-42 and 44, Applicant hereby elects Group II (claims 16-38, 41, 42, and 44) for prosecution. The election is made with traverse. The applicants respectfully submit that claim 43, depending from claim 16 and directed to a serial connection, should be examined with the Group II claims. Claim 43 is also amended herein to omit extraneous, post-claim annotation inadvertently included with the preliminary amendment.

The Examiner has required restriction between Group I claims 1-15, 39, 40, and 43, and Group II claims 16-38, 41, 42, and 44, on the basis that they do not relate to a single general inventive concept under PCT Rule 13.1 because under PCT Rule 13.2 they lack the same or corresponding special technical features. The official action posits certain described features that the groups of claims have in common, and concludes that they fail to define a special technical feature because they fail to make a contribution over the prior art.

In particular, the official action appears to take the position that the common technical feature among the groups of claims is a molybdenum back contact and CdS and/or ZnO buffer layer. However, there are other features common among the claims and not found in the prior art, which are special technical features defining a contribution over the prior art, in satisfaction of PCT Rule 13.2.

The applicants traverse on two bases: first, Rule 475 explicitly states that claims such as those presented in the application under consideration will be considered to have unity of invention; and second, the claims do share special technical features.

Rule 475

Rule 475(b)(1) specifically provides that claims of the type now pending "will be considered to have unity of invention: "An international or a national stage application containing claims to different categories of invention will be considered to have unity of invention if the claims are drawn only to one of the following combinations of categories: (1) A product and a process specially adapted for the manufacture of said product...." 37 CFR §

1.475 *Unity of invention before the International Searching Authority, the International Preliminary Examining Authority and during the national stage.*

Claims 16 and claims depending therefrom are product claims, and claim 1 is specially adapted for the manufacture of the product. Similarly, claims 11-13 are product claims, and claim 10 is specially adapted for manufacture of the product. Accordingly, the groups of claims have unity of invention and should be examined together.

Special technical features

Three documents of prior art have been cited, namely Haussler et al. (US 2002/0179143 A1), Levine (US 4,407,320) and Mitsuhiro et al. (US 6,281,427 B1).

Referring to Fig. 1, Levine describes a photovoltaic element comprising an insulating intermediate plastic layer 101, in which semiconductor particles 110 are incorporated. In certain intervals, conducting particles 111 are incorporated into that plastic layer 101 instead of semiconductor particles to form a lateral conducting line. The plastic layer 101 is provided on both of its flat sides with metallic foils 103, 105, which function as N- and P-side regions. The incorporated metal particles 111 protrude both sides of the plastic layer 101 so that a conductive bridge is built between both metal foils 103, 105. The metal foils 103, 105 exhibit discontinuities 107, which are positioned at adverse sides of the line formed by the metal particles 111. By means of these discontinuities, a serial arrangement of solar cells is achieved.

Haussler et al. describes flexible photovoltaic elements with chalcopyrite functional layers, especially a cadmium-sulphide buffer layer, and back contact consisting of molybdenum.

Mitsuhiro et al. deals with semiconductor devices in which the semiconductor component is incorporated in the form of granular crystals.

Claim 16 is as amended (with emphasis added) is directed to :

> A serial connection of solar cells having integrated semiconductor elements, wherein the serial connection comprises:

an insulating support layer into which one or more conductive elements are incorporated in a pattern, wherein the conductive elements protrude from the surface of the support layer on at least one side of the support layer, and the pattern defines at least one separation line having a width B and comprising at least one conductive element;

a plurality of spherical or grain-shaped semiconductor elements in the insulating support layer wherein the semiconductor elements comprise a substrate core that is coated at least with one conductive back contact layer made of molybdenum and with one semiconductor layer made of a I III VI compound semiconductor, and the semiconductor elements protrude from the surface of the support layer on at least one side of the support layer and form a pattern in which the areas next to a separation line or between several separation lines are fitted with semiconductor elements;

a conductive front contact layer on one side of the support layer on which the elements protrude from the layer;

a conductive back contact layer on the side of the support layer that is opposite from the front contact layer;

a buffer layer made of CdS and/or a layer made of intrinsic zinc oxide, or a buffer layer made of CdS and/or a layer made of intrinsic zinc oxide already on the spherical or grain-shaped semiconductor elements employed;

in each case, two separation cuts along a row of conductor elements wherein a first separation cut is made in the front contact layer and a second separation cut is made in the back contact layer, the separation cuts being on different sides of the row of conductive elements, and the separation cuts penetrate the back contact layer all the way to the support layer; and

on the side of the support layer on which the back contact layer of the solar cell is arranged, at least one of the semiconductor elements has a surface via which a direct contact is established between the back contact layer of the solar cell and the back contact layer of the semiconductor element.

The difference of the current invention over Levine is not only the molybdenum back contact and the CdS and/or ZnO buffer layer, as presented by the official action.

Rather, claim 16 states that the substrate core is coated with molybdenum.

However, Levine uses pre-assembled metal foils of aluminum to establish front and back contacts (col. 3, lines 7 to 10, col. 3, lines 23 to 26, col. 4, lines 33 to 37).

According to [0044] of the description of the current invention, PVD- or CVD- methods are applied to create the contact layers; in other words, those layers are created by a deposition process.

The direct deposition of the contact materials thereby leads to an improved electric contact between the contact sides and the semiconductor material and the material of the conducting passage. This leads to a reduced ohmic drop between the different layers (smaller contact resistance) and thus an increase of overall performance of the solar cell.

However, these coating or deposition methods can lack precision in terms of lateral structuring. In other words, the discontinuities in the pre-assembled metal foils of Levine cannot be easily prepared during deposition. This problem has been solved by the inventors by cuts, which are provided at the positions mentioned in claim 16 after covering the whole front and back surfaces with the contact material the first place.

Accordingly, the serial connection of solar cell represented by claim 16 shows several structural differences to that presented by Levine. The solar cells of the current invention comprise coated front and back contact layers, improving the overall performance and energy efficiency of the cells in comparison to those which use metal foils. At the same time, the cuts arranged into those contact layers allow the construction of serially arranged solar cells on one base structure.

These differences do not only increase performance of the cells, but also allow them to be produced in an easier way, which is the objective the current invention as stated in [0007] to [0009].

However, none of the documents cited give any hint as to replace the aluminum foils by a coated layer and in a second step to realize the isolation by cuts in the deposited layers.

Accordingly, the subject matter of claim 16 is new over the prior art and not obvious in regard of Haussler et al., Levine, and Mitsuhiro et al.

The features of (a) coating of at least with one conductive back contact layer made of molybdenum, and (b) making separation cuts in the front and back contact layers, are also found in claim 1. Accordingly, the claims share the special technical features defining a contribution over the prior art, in satisfaction of PCT Rule 13.2

In view of the foregoing, the applicants respectfully request withdrawal of the restriction requirement, and believe the application is in condition for allowance. Such action is solicited.

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Respectfully submitted,

By /Michael Muczynski #48,642/
Michael Muczynski
Registration No.: 48,642
MARSHALL, GERSTEIN & BORUN LLP
233 S. Wacker Drive
6300 Willis Tower
Chicago, Illinois 60606-6357
(312) 474-6300
Attorney for Applicant